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# Formative Research Activities To Provide Web-Based Nutrition Education to Adults in the Upper Rio Grande Valley

The Internet is a promising new tool for disseminating cancer prevention information. Barriers to full implementation include disparities in access and skill and availability of information relevant at the local level. A nutrition education Web site to promote fruit and vegetable intake is being produced for a tri-ethnic adult population in Colorado and New Mexico. Development is guided by findings from formative research including focus groups with local residents, a survey on computer and Internet use with 200 adults in 1998, an assessment of public access computer sites, and in-depth discussion with local community computer skills trainers. Key words: *cancer prevention information, multicultural adults, nutritive behavior, website*

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**G**EOGRAPHICALLY dispersed populations, older mean age, lower education attainment, and the multicultural and multilingual nature of adults in rural areas can make communication of cancer prevention information challenging. Internet technology, which is demonstrating efficacy in health education,<sup>1,2</sup> may overcome these barriers.<sup>3,4</sup> To take advantage of advancements, however, Internet technology must be accessible and adults must have the requisite skills. Both are barriers that may be most evident in poor, less educated, older, minority, and rural residents.<sup>5-8</sup> Also, health education Web sites must provide locally relevant and locally created information.<sup>9</sup>

A research team from the AMC Cancer Research Center in Denver (AMC); Colorado State University (CSU); La Plaza Telecommunity (LPT), which provides

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Internet service to 2,300 dial-up users and at 43 public access computers in Taos, Questa, and Penasco, New Mexico; San Luis Valley Community Connections (SLVCC), a community health organization; and the University of New Mexico (UNM) are producing a Web site to promote the intake of fruits and vegetables for cancer prevention<sup>10-12</sup> among Anglo, Hispanic, and Native American adults in the Upper Rio Grande Valley, a 12,297 square-mile, six-county region straddling the border between Colorado

and New Mexico. This region has very low population density (0.6 to 18.8 persons per square mile) and is home to a tri-ethnic population (Hispanic population ranges from 39% to 77% per county, and 7% to 15% of New Mexico residents are Native American Indians from eight northern pueblos). Compared with the rest of the nation, the population is older (median age, 28.1 to 37.5 years), less educated (60% to 84% with high school degrees; 10% to 24% with college degrees), and less affluent (per capita income of \$12,858 to \$17,766).

The Web site design is being guided by a carefully developed assessment of community technology and findings from focus groups. The investigators are testing community-based methods for training adults in computer skills.

## FORMATIVE RESEARCH METHODS

Formative research methods used to design the nutrition education Web site and develop strategies to improve Internet access included focus group discussions on nutrition behavior with local residents, a survey of computer and Internet use, an inventory of public access computer sites, and an in-depth discussion with community-based computer skills trainers.

### Focus groups on nutrition behavior

Four focus groups were conducted with adults in July 2000. One focus group in Taos, New Mexico, contained 10 Hispanic participants (three men); a second consisted of 14 Native American Indians

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(three men). In La Jara, Colorado, 10 Hispanic and Anglo adults (three men) participated in the focus group. The focus group in Monte Vista, Colorado, consisted of nine Spanish-speaking women of Hispanic descent. Participants ranged in age from 16 to 60 years.

Focus group discussions lasted 1.5 to 2.0 hours and were facilitated by an investigator and three research staff, two of whom were Hispanic and bilingual in Spanish. A moderator's guide was developed to structure probes for information about eating patterns and beliefs in the target population, including barriers to consumption of fruits and vegetables and topics to be included on a nutrition education Web site. Each adult in the focus groups was paid \$30 for participating. Focus group discussions were videotaped, and at least two research assistants viewed each videotape and summarized the ideas, themes, and comments.

### **Survey on computer use by adults in the Upper Rio Grande Valley**

In August 1998, a telephone survey was performed with a sample of 200 adult residents in Taos, Los Alamos, and Rio Arriba Counties in New Mexico and Alamosa, Conejos, Rio Grande, and Saguache Counties in Colorado. Sampling quotas proportional to the population size ensured that 100 respondents resided in the small towns of Alamosa, Monte Vista, Del Norte, Espanola, Los Alamos, and Taos and 100 respondents lived in outlying areas. Professional interviewers at AMC's Survey Research Center conducted telephone interviews. Interviewers dialed a total of 1,091

telephone numbers between the hours of 4 PM and 9 PM. The numbers were selected sequentially at random from a list of residential telephone numbers obtained from US West, Inc. Interviewers did not place callbacks if the call was not answered ( $n = 276$ ), busy ( $n = 6$ ), or answered by an answering machine ( $n = 291$ ). The first adult on the telephone was interviewed. A completion rate of 43.9% ( $200 \text{ completions} \div [200 \text{ completions} + 252 \text{ active household and respondent refusals} + 3 \text{ unreachable callbacks}]$ ) was achieved, with a refusal rate of 23.9% ( $252 \text{ refusals} \div [200 \text{ completions} + 854 \text{ nonrespondents}]$ ). Nonrespondents comprised 252 refusals, 573 noncontacts, and 29 others.<sup>50</sup>

Table 1 presents sample characteristics and survey questions. A three-level measure of computer and Internet use was created (no computer/Internet, computer but no Internet, computer and Internet) and compared across demographic categories using chi-square tests. Daily servings of fruits and vegetables were compared on demographics and computer/Internet use using  $t$  tests and analysis of variance. An alpha criterion of  $p < .05$  was applied to all tests of statistical significance.

### **Public access technology assessment**

Starting in August 2000, an assessment of public access sites containing computer and Internet technology was conducted. Sixty possible public access sites were contacted (i.e., public libraries, community colleges, senior centers, health clinics, and local schools) and sent a two-page, 30-item technology

**Table 1.** Overall percentage and mean responses to survey questions

	Total sample (SD)	Selected subsamples
Demographics		
Total number of respondents in survey	n = 200	
Age (in years)	44.5 (17.9)	
Education		
11th grade or less	7.5%	
High school graduate	33.0%	
Vocational, technical, or some college education	9.5%	
Two-year college graduate (AA)	11.5%	
Four-year college graduate (BA or BS)	26.0%	
Postgraduate	12.0%	
Ethnicity		
White	63.0%	
Hispanic	30.0%	
American Indian or Native American	2.0%	
Black or African American	1.0%	
Asian American	0.5%	
Other	1.5%	
Refused to answer	2.0%	
Annual household income (\$)	26,619 (42,922)	
Sex		
Male	40.5%	
Female	59.5%	
PC use		
Have a PC in the home	50.5%	
Total number of respondents with a PC in their home		n = 101
Home computer is connected to Internet or WWW		51.5%
Have used a PC at home or anywhere else	64.0%	
Total number of respondents who have used a PC		n = 128
Experience using PC		
Almost none		10.9%
A little		16.4%
Some		40.6%
A lot		32.0%
Used PC at		
My home		56.2%
My job or my spouse's job		49.2%
A local school		18.8%

(continues)

**Table 1.** Continued

	Total sample (SD)	Selected subsamples
A community center		6.2%
A local library		5.5%
My children's or a relative's home or job		4.6%
Some other place		5.4%
Used computer program on a CD-ROM disk		74.2%
Number of respondents who have not used a PC		n = 72
Would like to learn how to use a PC		33.3%
Where could you go to use a PC today		
Don't know		15.0%
My home		47.0%
My job		26.5%
Public library		23.5%
Local school, including a local college		12.5%
My spouse's job or my children's/parents' home or job		10.0%
A community center		8.0%
Some other place		3.0%
Other people in your family who have used a PC		
No one		13.0%
Child or grandchild		58.5%
Spouse		40.5%
Parent		16.5%
Brother or sister		18.0%
Internet/WWW use		
Heard of Internet or WWW	96.5%	
Total number of respondents who have used PC to access Internet		n = 193
Used a PC to get on the Internet or WWW		51.8%
Total number of respondents who have not used a PC to access the Internet		n = 93
Would like to learn how to use a PC to access the Internet or WWW		31.2%
Fruit and vegetable consumption		
Number of servings of fruits and vegetables usually eaten on average day	4.02 (2.64)	

SD, standard deviation; PC, personal computer; WWW, World Wide Web.

assessment. Managers were called to answer questions. When managers could not complete it, project staff visited that site and completed the assessment.

### **In-depth group discussion with LPT's community outreach trainers**

LPT employs community outreach trainers (COTs) in northern New Mexico. This train-the-trainer model was first utilized in LPT's Diabetes Wellness Connection (DWC) project. The research team decided to employ the COT program to promote Internet adoption and use by local residents throughout the Valley, given its success in the past. To provide more information on LPT's community-based computer and Internet training program, in September 2000 an in-depth, 1.5-hour group discussion was held among the three COTs who had worked on the DWC, a COT currently employed by LaPlaza, La Plaza's director of computer training and her assistant, and the investigators and staff from the project. Discussion covered the tasks involved in the COT's job, methods used by the COT to identify and train new users in local communities, and benefits of the COT training program and areas for improvement.

## **RESULTS OF FORMATIVE RESEARCH STUDIES**

### **Focus group discussions**

Individual tastes varied. Adults named a wide variety of fruits and vegetables that they liked. Most of the foods mentioned were available in local stores. Cactus was

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***Adults mentioned many barriers to eating more fruits and vegetables including availability and quality, taste, personal and family preferences, and cost.***

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the most unusual food mentioned. However, many people raise fruits and vegetables in home gardens.

Adults mentioned many barriers to eating more fruits and vegetables. These included availability and quality of these foods at local stores, taste, personal and family preferences, cost (although this did not emerge spontaneously in our lowest income group), competition from other foods (eg, ice cream; high-carbohydrate foods that fill up children), spoilage, lack of preparation skills, lack of planning for fruit and vegetable recipes, and pesticide residues. To eat more fruits and vegetables, adults said they should plan more, buy fruits and vegetables more often so they are available in the refrigerator, include them in lunches, buy fruit and vegetable juices in "to go" containers, prepare them at the beginning of the week, and watch for sales on these food items.

When asked about beliefs related to food, several adults said that food is sacred and not to be wasted. A family celebrates richness and happiness with food, and food shows that a family cares for one another. It is not polite to refuse food. One should always make a lot of food when cooking to feed everyone who might visit. Some beliefs were passed down through generations (eg, respecting

food and eating it when it is given to you because it took work to grow and prepare it). A few people felt that foods sold in stores are deficient in nutritional value compared with foods raised at home. Certain foods are associated with good luck or the cook's mood (eg, very hot salsa is prepared by an angry wife). The focus groups identified a few beliefs about the relationship of food and food preparation methods to health (eg, butter causes heart attacks; eating guacamole at night will make children sick).

Local nutrition professionals reported that community celebrations were an important aspect of food consumption. Respondents reported preparing many typical US holiday foods like casseroles, hamburgers, turkey, and salads for celebrations, as well as foods of Hispanic origin such as green and red chili, tortillas, posole, tamales, empanadas, pinocha (sprout pudding), and bizcochito (small cookies). Few specific vegetables were mentioned as feast foods.

No traditional Native American foods were named in the focus groups. Native American participants noted that the number of celebrations has increased. Thus, people are "feasting" more often. Some Native American women identified two kinds of food in the community: fiesta foods that came from the Spaniards and corn-based foods that were more spiritual and traditional. They speculated that Native Americans might be healthier if they returned to eating more traditional foods such as game, vegetables, and herbs.

Adults reported that they received health and nutrition information from a variety of sources including family

(especially mothers), friends, media (books, newspapers, magazines, television), traditional and nontraditional health professionals (physicians, nutritionists, herbalists, health food stores), and formal courses. A few adults used the Internet. Adults wanted more information on vitamins and minerals, the effect of food on the body (eg, immune system; energy level), how to read food labels, what to eat and avoid to maintain health and prevent diseases (eg, cancer, cardiovascular disease, diabetes), quality of processed foods, genetics and diet, emotion and diet, food preparation, weight loss, and practical (fast, simple, and easy) recipes.

Children's diet was of high interest. The quality of school lunches emerged spontaneously, and parents were displeased with the regimen of pizza, hamburgers, and French fries. Children preferred these foods and would not eat healthier foods at home. Parents worried that their children were overweight and did not understand food and food preparation.

For a nutrition education program, adults suggested including top 10 fruits and vegetables; comparison of fresh versus canned fruits and vegetables; serving size information; health benefits of foods and their role in a balanced diet; benefits of herbs; simple, convenient recipes and meal plans for a variety of fruits and vegetables; a recipe of the day; weight loss charts; unfavorable effects of food advertising; ways that consumption promotes local agriculture; and storage of fruits and vegetables, especially without refrigeration. Adults also preferred pictures over text, local recipes, attractive charts,

animation, phrases and slogans, trustworthy information, familiar local foods, information in Spanish as well as English, stories, word games, a calendar of available fruits and vegetables, and local and famous role models.

### Telephone survey on computer and internet use

In 1998, half of the respondents interviewed in the study region had a personal computer at home and nearly two thirds had used one, at home (most commonly), on the job, at school, or at another public site. Over one fourth of the users said they had little or almost no computer experience; 15% did not know where they could use one. Nearly all respondents were aware of the Internet, and half had used it (51% of home computers were connected). One third of nonusers said they wanted to learn to use a computer or the Internet (Table 1). Combined, 47% had used a computer and the Internet, 21% had used a computer but not the Internet, and 32% had used neither. Fewer Hispanics than whites owned a computer (32% versus 59%  $p < .001$ ) or had used the Internet (40% versus 58%;  $p = .026$ ). Computer/Internet use was highest among the more educated ( $\chi^2 = 45.84$ ,  $p < .001$ ), younger ( $\chi^2 = 74.22$ ,  $p < .001$ ), male ( $\chi^2 = 6.21$ ,  $p = .045$ ), white ( $\chi^2 = 6.14$ ,  $p = .046$ ), and adults in small towns rather than outlying areas ( $\chi^2 = 16.08$ ,  $p = .059$ ).

Adults reported a mean daily intake of 4.02 servings of fruits and vegetables. Intake was not associated with computer/Internet use ( $F = 5.90$ ,  $p = .433$ ). Whites (4.35) ate more servings of fruits

and vegetables than Hispanics (3.57;  $t = 1.90$ ,  $p = .059$ ).

### Public access technology assessment

By January 2001, technology assessments were completed with 48 sites in the Valley whose managers confirmed that they offered nearly 400 public access computers with Internet service (see Table 2; 11 sites had no public access computers; 1 site had no Internet service). Most computers use Window-based operating systems, and nearly all have printer access. Many computers, though, have limited random access memory (RAM) and smaller monitors (15 inches or less) set to low resolution. Currently, only 37% of the computers at the public access sites have a broadband T1 connection to the Internet, and another 8% have access at 128K per second or higher. Almost all of the computers with dial-up Internet service use 56.6K modems. Most computers run the latest versions of Internet Explorer or Netscape. Most sites allow plug-in programs (eg, Macromedia's *Shockwave* player) to be loaded into their Web browsers and do not prohibit "cookies" (programs placed in local machines to identify the user during visits to a Web site).

### Group discussions with COTs

COTs relied on their personal contacts in the local community to identify new users. Sometimes the COTs offered to demonstrate the Internet to residents; other times, residents approached COTs for training. Three of the COTs spent most of their time in local public access sites. One COT visited local homes with

**Table 2.** Summary of responses to technology assessment of public access computer sites in the Upper Rio Grande Valley as of January 2001 (n = 48 sites)

	%		%
Modem speed		Computer type	
56.6	90	PC (Windows based)	89
28.8	8	Macintosh	11
33.3	2		
Internet connection speed		RAM	
T1	37	60–64 M	41
56.6 K	31	120–128 M	28
128 K	3	28–32 M	18
320 K	2	96 M	7
28.8 K	2	16–24 M	4
240 K	1	40–48 M	2
Unknown	22		
Browser type/version		Resolution setting on monitor	
Internet Explorer 5.0	53	800 × 600	68
Netscape Communicator 4.7	29	640 × 480	27
Internet Explorer 3.0–4.7	10	1024 × 628	4
Netscape Communicator 4.0–4.6	4	1024 × 768	4
Netscape Navigator 3.0–4.05	4		
Monitor size		Plug-in programs permitted on browser	
17 inch	36	Yes	77
13 inch	34	No	10
15 inch	28	Unknown	13
14 inch	2		
Cookies permitted on browser		Printer access	
Yes	92	Yes	97
No	8	No	3

RAM, random access memory.

a laptop computer and dial-up Internet connection. COTs often highlighted the fact that they had very little previous experience with computers before becoming COTs to convince local adults that they could master the technology. COTs provided training in computer skills by referring new users to classes offered

at LPT’s Community Technology Center and by training individuals or small groups at the local public access sites. COTs created their own training materials for local training sessions. Many new users returned for continuing training and support from the COTs, some for as long as a year.

## DISCUSSION AND IMPLICATIONS

The formative research provided guidance on how to design a nutrition education Web site to be relevant to local residents and how to recruit and train them to use it.

### **Designing the nutrition education Web site**

#### ***Locally relevant nutrition content***

The similarity in foods across the focus groups and the lack of rare or traditional foods suggest that there is one diet in the region with simple, convenient recipes and a sizable proportion of "fast food." Hispanic and Native American populations share this diet with Anglo residents. Although respondents expressed nostalgia for the "old ways," traditional diets and foods were not evident in practice. Thus, it should be possible to effectively promote fruits and vegetables to everyone in the Upper Rio Grande Valley, with minor consideration of regional differences and unusual, local foods of Spanish or Native American origins. Moreover, traditional foods within the Native American Indian population appear to be "off limits" to a Web site created by a non-Indian research group and intended for a general local audience. Some Spanish language is needed within the Web site. Advice on growing fruits and vegetables should be attractive on the Web site. Information on how to properly feed children, how to create preferences in children for fruits and vegetables, and how to counteract media depictions of

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***As parents do not model the best food behaviors at home, information on changing the entire family's diet is required as well.***

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fast, processed foods should be of high interest, too.

As parents do not model the best food behaviors at home, information on changing the entire family's diet is required as well. One anomaly surfaced by the focus groups was that Spanish-speaking mothers reported more consumption of fruits and vegetables than other focus group participants. This may be because they reported eating in restaurants infrequently and buying fruits and vegetables in large quantities and when on sale. Information on the Web site is needed to help people select dishes with fruits and vegetables when eating out in restaurants.

From this, five themes or topics for the Web site emerged: (1) celebrate fruits and vegetables, (2) eat five or more servings of fruits and vegetables, (3) modify favorite or traditional foods, (4) overcome barriers, and (5) get the whole family involved.

#### ***Limitations on Web site technology***

Nearly one half of public access computers have broadband Internet access, run the most recent Web browsers, and permit plug-in and cookie technology. However, the 56.6K modem speed; limited RAM; and small, low-resolution monitors restrict Web site performance. LPT reports that many dial-up users

receive no better than a 26K connection due to deficiencies in the local telephone network. One production goal, then, is to author a Web site in which any page takes no more than 10 seconds to load over a 28.8K connection. This requires very small files and makes most streaming video or audio files impossible. Messages will need to be carried by static graphics and text. However, the small monitors mean that the Web site cannot have a large amount of text or numerous graphic elements on each page and still be easily readable. While most public access computers have printer access, some sites require users to pay for paper, so the nutrition education Web site will not require that users print information. Other limitations undoubtedly will be encountered as the Web site is tested on the lowest speed, most limited computers.

### **Recruiting residents to use the nutrition education Web site**

#### ***Existing local internet use***

A sizable proportion of the population in the Upper Rio Grande Valley had used computer and Internet technology by 1998, suggesting sufficient use 3 years ago to make it feasible to test the efficacy of a Web-based cancer prevention program. Internet usage in the Valley has undoubtedly increased since then. Fortunately, there are a substantial number of public access computers with Internet access in the six-county region so that new users can access the nutrition education Web site if they do not have a computer at home. It is apparent, though, that other challenges will exist such as ensuring that

the public access sites provide sufficient time for participants to view most of the Web site and providing sufficient local technical support to keep public access computers operational.

The 1998 survey also identified a gap between knowledge and use of the Internet. While recent national trends suggest that this gap has narrowed, the research team believes that an unrealized demand for training in computer and Internet skills exists. Community-based training appears to be a viable strategy for closing this gap and recruiting participants to a test of the Web site. While the classes at LPT's Community Technology Center provide the best training, COTs should be able to provide one-on-one training and support right in local communities at public access sites, where many residents prefer to receive it. However, training and recruitment might be improved by using laptop computers to introduce the technology to residents in their homes. The role of COTs will be multifaceted and include mobilizing community resources, training computer and Internet skills, reinforcing existing skills, and providing technical support for public access sites and home computer users. The recruiting and training provided by COTs will be augmented with low-cost additional methods for utilizing local informal opinion leaders and on-line instructional materials to aid local training sessions.

### **LIMITATIONS**

Each of these formative research studies was small and therefore contained limitations. The information on diet and community-based computer training

from four focus groups and four COTs is cursory. Thus, the content, format, and functioning of the Web site will be extensively tested with local residents and a pilot study of COT training and performance will be conducted. Likewise, the survey of computer use was conducted only with residents who had telephones and were reached by a single telephone call, so the proportion of households with Internet access is probably overestimated. Despite this, a sufficient proportion of the population has used a personal computer and the Internet. Finally, some site managers did not fully understand their technology, so some of the information may be in error. We checked sites where managers were uncertain and will

continually update this assessment during the trial.

## SUMMARY

An effective nutrition education Web site must reflect local attitudes and practices related to fruits and vegetables. Methods for producing effective health education Web sites and bridging the digital divide in rural areas require careful planning. With the rapidly growing adoption of the Internet, even in the most remote areas of the country, it is critical that cancer prevention specialists have the knowledge to use this important new tool of health communication.

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